**Project: CCSSM Standards Investigation**     **Names** _____

This project involves the Common Core State Standard for Mathematics elaborated on the following site: http://www.corestandards.org/Math . Complete the following quote.

"The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important 'processes and proficiencies' with longstanding importance in mathematics education. The first of these are the NCTM process standards of _____ _____, _____ and _____, communication, _____, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report _____ *It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, _____ , efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, _____, and worthwhile, coupled with a belief in diligence and one's own efficacy)."

The Common Core State Standards in Mathematics introduce "Operations and Algebraic Thinking" in which grade level? _____

Fill in the blank with the appropriate term from the list: Clusters, Domains, Standards.

_____ define what students should understand and be able to do.

_____ summarize groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

_____ are larger groups of related standards. Standards from different domains may sometimes be closely related.

Here is an example from grade 3:
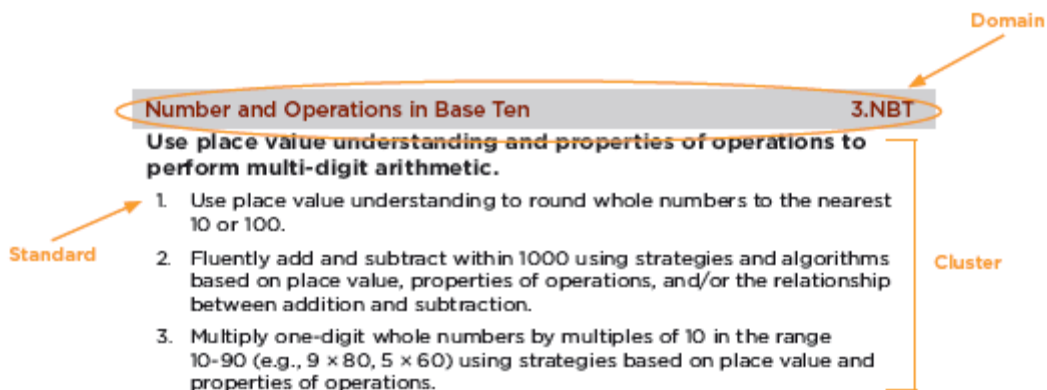


Geometry standards (studied in Math 3002, your spring semester, junior year ECE math course) in the Common Core start in what grade level? _____

Expressions & Equations standards (studied here in Math 3001) in the Common Core start in what grade level? _____

Ratios & Proportional Relationships standards (studied here in Math 3001) in the Common Core start in what grade level? _____

Functions standards (studied here in Math 3001) in the Common Core start in what grade level? _____

Statistics & Probability (studied in Math 3003, your fall semester, senior year ECE math course) standards in the Common Core officially start in Grade 6.   True or False. _____

To illustrate the overlap between various content areas, notice the following measurement and data standards:

- CCSS.Math.Content.2.MD.D.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a _____ _____, where the horizontal scale is marked off in whole-number units.

- CCSS.Math.Content.2.MD.D.10 Draw a _____ graph and a _____ graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

These are clearly statistical concepts. They are taught in what grade here in CCSSM? _____

Focus now on the "Operations & Algebraic Thinking" standards. Complete the following Kindergarten-level standards.

☐ CCSS.Math.Content.K.OA.A.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or _____ .

☐ CCSS.Math.Content.K.OA.A.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

For Grade 1, we have the following 4 clusters. Complete the standards/examples.

- **Represent and solve problems involving addition and subtraction.**

  o CCSS.Math.Content.1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the _____ number to represent the problem.

  o CCSS.Math.Content.1.OA.A.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

- **Understand and apply properties of operations and the relationship between addition and subtraction.**

  o CCSS.Math.Content.1.OA.B.3 Apply properties of operations as strategies to add and subtract.[2] *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (_____ property of addition.) To add 2 + 6 + 4, the second two*

*numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12.*
*(_____ property of addition.)*

- o [CCSS.Math.Content.1.OA.B.4](#) Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*

- **Add and subtract within 20.**

  - o [CCSS.Math.Content.1.OA.C.5](#) Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

  - o [CCSS.Math.Content.1.OA.C.6](#) Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = _____ ); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = _____ ).

- **Work with addition and subtraction equations.**

Perform these calculations!

[CCSS.Math.Content.1.OA.D.7](#) Understand the meaning of the equal sign, and
$$5 + 2 = 2 + 5 \quad _____, \qquad 4 + 1 = 5 + 2 \quad _____.$$

  - o [CCSS.Math.Content.1.OA.D.8](#) Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations.* $8 + \_\_\_ = 11,$ $5 = \_\_\_ – 3,$ $6 + 6 = \_\_\_.$

For Grade 2, we have the following 3 clusters.

- **Represent and solve problems involving addition and subtraction.**

  - o [CCSS.Math.Content.2.OA.A.1](#) Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

- **Add and subtract within 20.**

  - o [CCSS.Math.Content.2.OA.B.2](#) Fluently add and subtract within _____ using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

- **Work with equal groups of objects to gain foundations for multiplication.**

  - o [CCSS.Math.Content.2.OA.C.3](#) Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them

by 2s; write an equation to express an even number as a sum of two equal addends.

- o CCSS.Math.Content.2.OA.C.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

For Grade 3, we have the following 4 clusters. Complete the standards/examples.

- **Represent and solve problems involving multiplication and division.**

  - o CCSS.Math.Content.3.OA.A.1 Interpret products of whole numbers, e.g., interpret _____ as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*

  - o CCSS.Math.Content.3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*

  - o CCSS.Math.Content.3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

  - o CCSS.Math.Content.3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ___ = 48, 5 = ___ ÷ 3, 6 × 6 = ___*

- **Understand properties of multiplication and the relationship between multiplication and division.**

  - o CCSS.Math.Content.3.OA.B.5 Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (_____ property of multiplication) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (_____ property of multiplication) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (_____ property)*

  - o CCSS.Math.Content.3.OA.B.6 Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*

- **Multiply and divide within 100.**

  - o CCSS.Math.Content.3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g.,

knowing that 8 × 5 = 40, one knows 40 ÷ 5 = _____ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

- **Solve problems involving the four operations, and identify and explain patterns in arithmetic.**

  - CCSS.Math.Content.3.OA.D.8 Solve two-step word problems using the four operations. Represent these problems using equations with a _____ standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

  - CCSS.Math.Content.3.OA.D.9 Identify _____ _____ (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

For Grade 4, we have the following 3 clusters. Complete the standards/examples.

- **Use the four operations with whole numbers to solve problems.**

  - CCSS.Math.Content.4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret _____ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

  - CCSS.Math.Content.4.OA.A.2 Multiply or divide to solve word problems involving _____ comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from _____ comparison.

  - CCSS.Math.Content.4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and _____ strategies including rounding.

- **Gain familiarity with factors and multiples.**

  - CCSS.Math.Content.4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is _____ or composite.

- **Generate and analyze patterns.**

  - CCSS.Math.Content.4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1,*

*generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

For Grade 5, we have the following 2 clusters. Complete the standards/examples.

- **Write and interpret numerical expressions.**

    o CCSS.Math.Content.5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

    o CCSS.Math.Content.5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as _×(_____). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

- **Analyze patterns and relationships.**

    o CCSS.Math.Content.5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the _____ _____ on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

For 4 extra points:

Watch the video from the link "Learn About the Common Core in 3 Minutes" [http://www.corestandards.org/video/] and write a brief summary/reaction paragraph, with clear delineation between you summary and personal reaction. This is the individual part of the project; attach the paragraphs to the end of this document.

**This project is worth 100 points and is due no later than _____.**

**Do your best! Live and learn!**